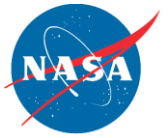


NASA's SBIR Technology Infusion in a New Environment

Carol R. Lewis

Jet Propulsion Laboratory

Mirror Technology SBIR/STTR Workshop

June 21-23, 2011

Greenbelt, MD

National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

www.nasa.gov

Overview

- **NASA's Space Technology Program and Office of the Chief Technologist (OCT)**
  - NASA SBIR: part of Early Stage Innovation Division
  - Mid TRL Divisions
  - Proposed FY'12 Space Technology Program Budget
  - Crosscutting Post Phase 2 Opportunities
  - OCT Drivers: Space Technology Roadmaps and Grand Challenges
- **NASA SBIR - Post Phase 2**
  - NASA Phase 2-E and Phase 3
  - Mission-Directorate-Specific Post Phase 2 Opportunities
- **Some Commercial and Business Development Resources**
- **Points of Contact**

External Drivers in Creation of NASA's Space Technology Program

- **NASA Authorization Act of 2008**

  http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.6063:

- **NRC report, "A Constrained Space Exploration Technology Program: A Review of NASA's ETDP" (2008)**

  http://www.nap.edu/catalog.php?record_id=12471

- **NRC report, "America's Future in Space: Aligning the Civil Space Program with National Needs" (2009)**

  http://www.nap.edu/catalog.php?record_id=12701

- **NRC report, "Fostering Visions for the Future: A Review of the NASA Institute for Advanced Concepts (2009)**

  http://www.nap.edu/catalog.php?record_id=12702

- **Augustine Committee – Review of U. S. Human Space Flight Plans (2009)**

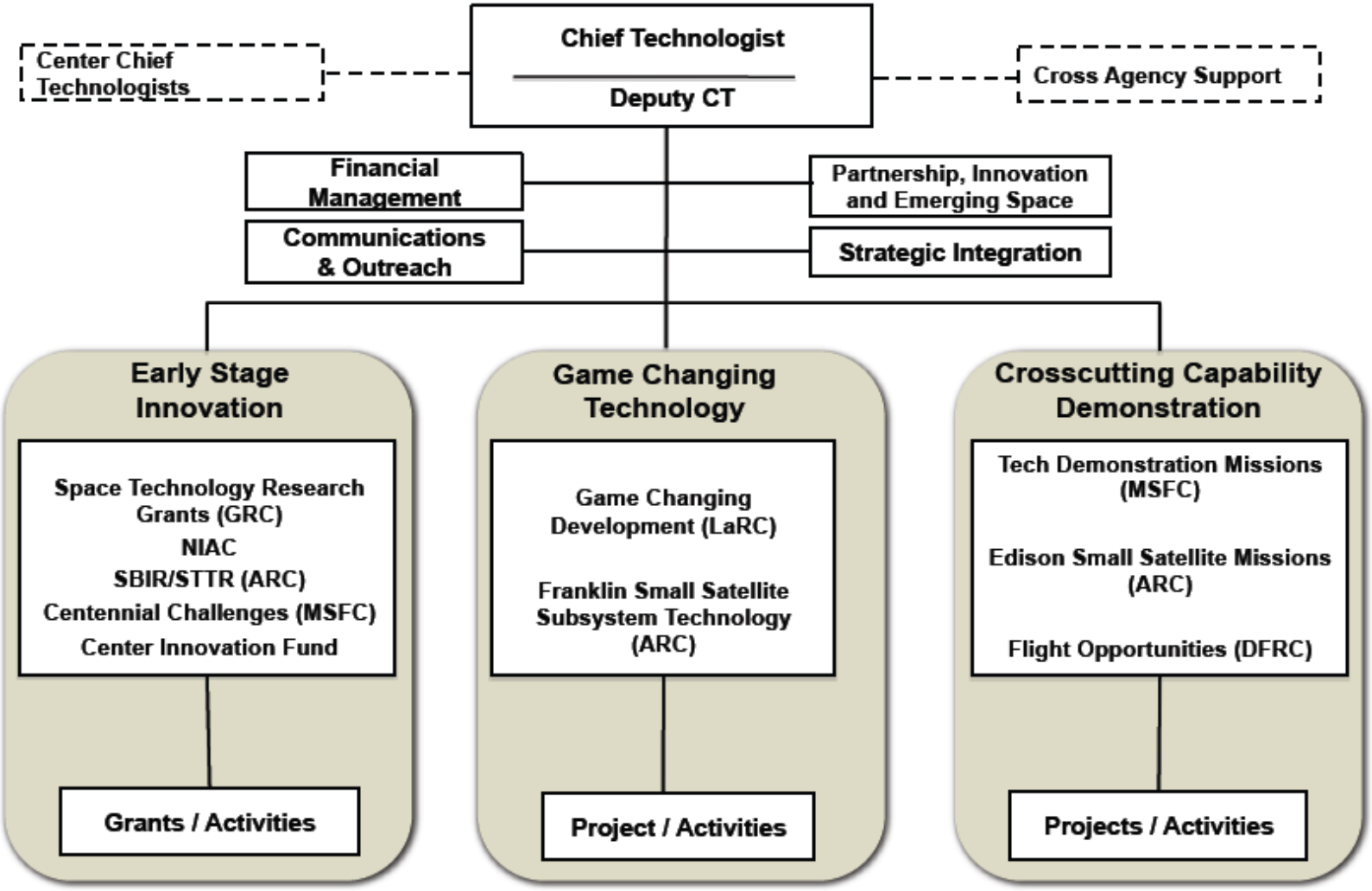
  http://www.nasa.gov/offices/hsf/meetings/10_22_pressconference.html

- **NRC report, "Capabilities for the Future: An Assessment of NASA Laboratories for Basic Research" (2010)**

  http://books.nap.edu/catalog.php?record_id=12903

Reference: on NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : "Space Technology: Investments in our Future; FY12 Overview, March 2011", Office of the Chief Technologist, posted as "527871main_Space_Tech_FY12_Overview_external_ver3.pdf"

Office of the Chief Technologist Organization



From NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : "Space Technology: Investments in our Future; FY12 Overview, March 2011", Office of the Chief Technologist, posted as "527871main_Space_Tech_FY12_Overview_external_ver3.pdf"

OCT Early Stage Innovation Division

- Sponsors wide range of advanced space system concepts and low TRL technology development by academia, industry and NASA Centers.
  - **SBIR/STTR: Technology development and infusion into NASA missions.**
  - **Space Technology Research Grants**: Innovative research in advanced space technology; includes grants and graduate fellowships for student research.
  - **NASA Innovative Advanced Concepts (NIAC)**: Innovative aeronautics and space system concepts for future NASA missions.
  - **Center Innovation Fund**: Creative research and technical innovation at NASA Centers.
  - **Centennial Challenges**: Prizes to address key technology needs with new innovation sources outside traditional aerospace community.
- 100% of this work will be competed.

References: on NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : (a) “Space Technology: Investments in our Future; FY12 Overview, March 2011”, Office of the Chief Technologist, posted as “527871main_Space_Tech_FY12_Overview_external_ver3.pdf” ; (b) “OCT Overview Presentation, October 2010”, Dr. Bobby Braun, posted as 485335_main_OCT_Overview_slides.pdf”

OCT Game Changing Technology Division

- Matures advanced space technologies that may lead to fundamentally new approaches for future space missions and solutions to significant national needs.
  - **Game Changing Development Program**: Innovative ideas that either enable new capabilities or radically change current approaches to space systems.
  - **Franklin Small Satellite Subsystem Technology Program:** Enables small satellites to provide game-changing capabilities.
- Includes ground-based testing and laboratory experiments/demos.
- **Mid-TRL development**; prepares technologies for potential system level flight demos.
- A high percentage of this work (>70%) will be competed.

References: on NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : (a) “Space Technology: Investments in our Future; FY12 Overview, March 2011”, Office of the Chief Technologist, posted as “527871main_Space_Tech_FY12_Overview_external_ver3.pdf” ; (b) “OCT Overview Presentation, October 2010”, Dr. Bobby Braun, posted as 485335_main_OCT_Overview_slides.pdf”

OCT Crosscutting Capability Demonstrations Division

- Matures select crosscutting technology capabilities, that benefit multiple customers or enable multiple future space missions**, to flight readiness (TRL 7)**. Includes flight test projects where in-space demo is needed before mission applications.
  - **Edison Small Satellite Demonstration Missions Program:** Develops and operates a series of NASA-focused small satellite demo missions, in collaboration with academia and small businesses.
  - **Flight Opportunities Program:** Provides flight opportunity environments: reduced gravity, brief periods of weightlessness (parabolic arc flights), high altitude atmospheric research.
  - **Technology Demonstration Missions Program:** Matures select crosscutting technologies via flight demos. Includes partnerships with NASA Mission Directorates, industry, academia, other government agencies.
- A high percentage of this work (>70%) will be competed.

References: on NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : (a) “Space Technology: Investments in our Future; FY12 Overview, March 2011”, Office of the Chief Technologist, posted as “527871main_Space_Tech_FY12_Overview_external_ver3.pdf” ; (b) “OCT Overview Presentation, October 2010”, Dr. Bobby Braun, posted as 485335_main_OCT_Overview_slides.pdf”

Proposed FY'12 Budget: NASA Space Technology Program

Mission Directorate:	**Space Technology**
Theme:	**Space Technology**

FY 2012 Budget Request

Budget Authority ($ millions)	FY 2010	Ann CR. FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 President's Budget Request	275.2	=	1,024.2	1,024.2	1,024.2	1,024.2	1,024.2
SBIR and STTR	96.0	-	177.3	176.8	175.6	174.3	172.8
Partnership Development and Strategic Integration	20.3	-	19.5	19.4	19.3	19.1	19.0
Crosscutting Space Technology Development	7.5	-	433.3	432.1	429.2	425.8	422.4
Exploration Technology Development	151.4	-	261.3	259.3	257.5	255.5	253.4
ST Civil Service Labor and Expenses	0.0	-	132.9	136.6	142.6	149.5	156.6

Note: FY 2010 and FY 2011 figures have been adjusted to show comparable Exploration technology content from the Exploration account, and the movement of the Innovative Partnerships Program from the Cross Agency Support account, within the Space Technology account consistent with the FY 2012 Budget. The FY 2010 level shown does not include the $51.7 million transferred to the Science and Exploration accounts, to be made available to the SBIR/STTR programs in FY 2011.

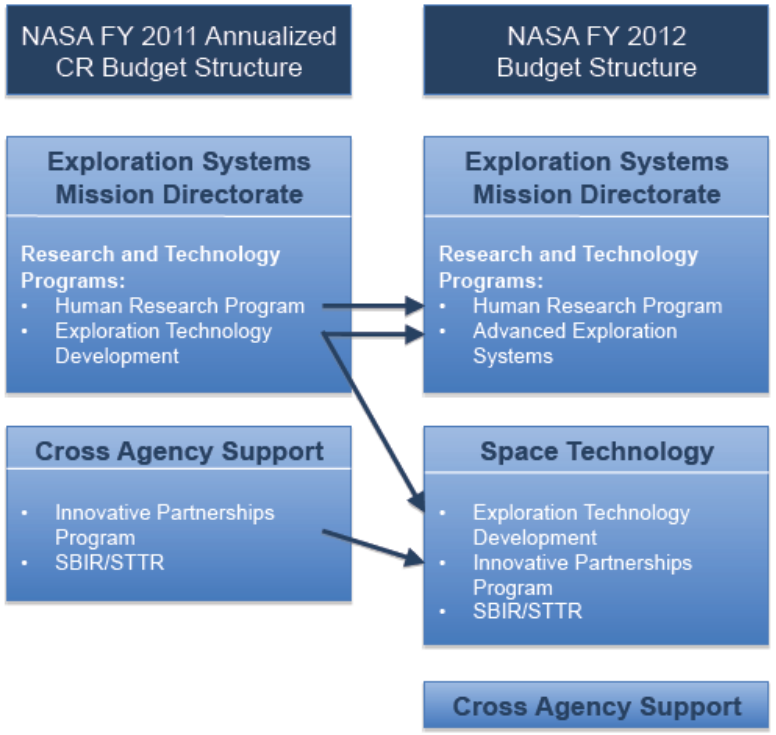
Reference: NASA Budget Document homepage http://www.nasa.gov/news/budget/index.html
FY 2012 Budget Estimate - Space Technology "516653main_NASA_FY12_Budget_Estimates-Space_Tech.pdf"

Crosscutting Space Technology Development – Potential Post Phase 2 Funding Sources

- Candidate technologies should be applicable to:
  - More than one NASA Mission Directorate (MD), or
  - A NASA MD and an external Federal agency, or
  - A NASA MD and a commercial application.
- Technologies applicable exclusively to one NASA MD will probably not be considered unless truly revolutionary.
  - Instead seek follow-on funding from MD-specific sources (more on that later).
- Advancement from the Early Stage Innovation Division into the mid-TRL Divisions is not automatic. **One good option is for your company to get onto an appropriate team (or lead a team) that is proposing to Game Changing Technology or Crosscutting Capability Demos.**
  - Use your NASA points of contact, either SBIR or non-SBIR.
  - Learn as much as you can about the Space Technology Program - especially its new initiatives.

Exploration Technology Development – Potential Post Phase 2 Funding Sources

- Much of the ETD program will move from ESMD into Space Technology in FY'12.
- Developing long-range, Exploration-specific technologies to enable future human Exploration missions. ESMD is main customer.
- **Program components will be managed by Game Changing Development and Technology Demonstration Missions … potential Post Phase 2 funding sources.**
- OCT's and ESMD's goal is to complete transition by start of FY'12.



Reference: on NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : "Space Technology: Investments in our Future; FY12 Overview, March 2011", Office of the Chief Technologist, posted as "527871main_Space_Tech_FY12_Overview_external_ver3.pdf"

Recent Space Technology Program Funding Opportunities

- SBIR/STTR, Flight Opportunities, Center Innovation Fund, and Centennial Challenges are ongoing programs, funded in 2011 CR based on enacted FY 2010 levels.
- Space Technology Graduate Fellowship call closed Feb 23; selections anticipated for start of Fall 2011 academic semester.
- Initial NIAC, Game Changing Development, and Technology Demonstration Mission proposal calls released March 1.

  http://www.nasa.gov/offices/oct/home/solicitations.html

  http://nspires.nasaprs.com/external/

  –NIAC NRA for Phase 1 Studies (NNH11ZUA001N): Proposals due May 16, 2011.

  –Game Changing Development BAA for Unique And Innovative Space Technology (NNH11ZUA001K): Open through January 3, 2012.

  –Tech Demo Missions BAA (NNM11ZDA001K): Proposals due June 24, 2011.

Reference: on NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : "Space Technology: Investments in our Future; FY12 Overview, March 2011", Office of the Chief Technologist, posted as "527871main_Space_Tech_FY12_Overview_external_ver3.pdf"

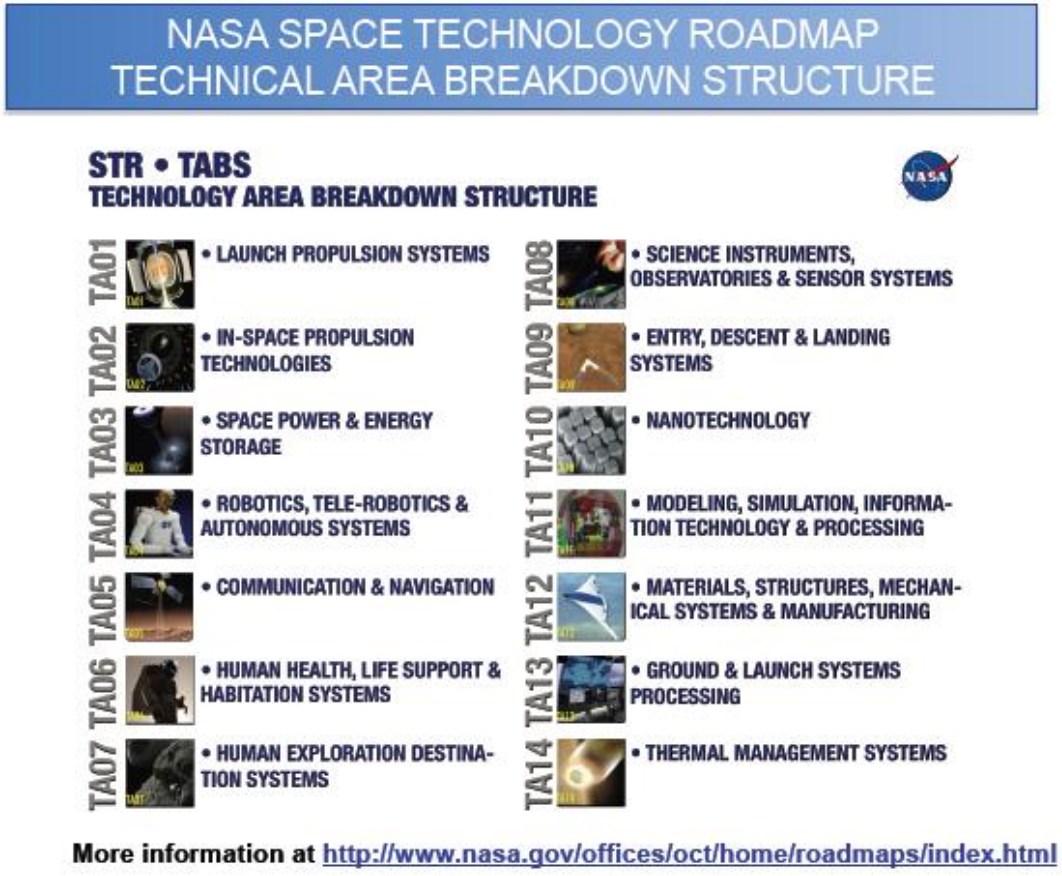
More Updates on Space Technology Program Funding Opportunities

- OCT not planning to make awards in some areas till FY'12:
  - Space Technology Research Grants
  - Franklin Small Satellite Subsystem Technology
  - Edison Small Satellite Demonstration Missions
- **Awards from already-issued proposal calls are contingent on available funds in FY'11 and FY'12.**
- **All proposals to OCT funding calls must align with major drivers - NASA OCT's Space Technology Roadmaps and Grand Challenges.**

Reference: on NASA OCT public home page http://www.nasa.gov/offices/oct/home/index.html : "Space Technology: Investments in our Future; FY12 Overview, March 2011", Office of the Chief Technologist, posted as "527871main_Space_Tech_FY12_Overview_external_ver3.pdf"

NASA OCT Space Technology Roadmaps

- Prepared by NASA teams under OCT guidance - Integrated set of 14 draft roadmaps for National Research Council (NRC) review.
- With technical community input, NRC will provide its recommendation reports in 9/2011 (interim) and 1/2012 (final).



References: on NASA OCT public website http://www.nasa.gov/offices/oct/home/roadmaps/index.html and http://sites.nationalacademies.org/DEPS/ASEB/DEPS_060733

NASA OCT Space Technology Grand Challenges

- Open call for cutting-edge technological solutions that solve important space-related problems, radically improve existing capabilities or deliver completely new space capabilities.

National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Reference: on NASA OCT public website http://www.nasa.gov/offices/oct/strategic_integration/grand_challenges_detail.html

NASA SBIR Phase 2-E

- NASA has developed a Phase 2 Enhancement (2-E) policy to encourage transitioning SBIR research into NASA programs and private sector.
  - **Can provide a company with up to $150K of additional Phase 2 SBIR/STTR funds; company must provide matching (cost sharing) funds from a non-SBIR/STTR source.**
  - **Can extend an existing Phase 2 contract from 4 months up to one year.**
- NASA has provided eligible companies with official guidance, including what types of relationships between a small company and outside investors qualify as an investment.
- During Phase 2, small business must submit a Phase 2-E application via the Contract Administration and Closeout EHB. Submittal window is specified in advance by NASA HQ.
  - '07 Phase 2 companies were eligible in 2010. (NASA's first year for 2-E).
  - **'08 Phase 2 companies are eligible this year, 2011. Proposals being submitted.**
  - '09 Phase 2 companies will be eligible next year, 2012.

NASA SBIR Phase 3 Contracts

- NASA may award Phase 3 contracts for products or services with non-SBIR/STTR funds. **An agency that wishes to fund a Phase 3 project is not required to conduct another competition. (Advantage over other types of post Phase 2 funding).**
- Phase 3 work may be for products, production, services, R/R&D, or any combination of these. A Federal agency may enter into a Phase 3 agreement at any time with a Phase 1 or Phase 2 awardee.
- No limit on number, duration, type, or dollar value of Phase 3 awards made to a business concern.
- No limit on the time that may elapse between a Phase 1 or Phase 2, and a Phase 3 award.
- For more information see the NASA SBIR/STTR Proposal Solicitation.
  - 2010 Solicitation is at

    http://sbir.nasa.gov/SBIR/sbirsttr2010/solicitation/index.html

    NASA HQ will publish the 2011 Solicitation on or about July 7, 2011.
- If you have a prospective NASA Phase 3 funding source, contact our SBIR Program Office for information on how to get it implemented.

NASA SMD:
Some Potential Post Phase 2 Funding Sources

- **Research Opportunities in Space and Earth Sciences (ROSES) NRA**
  - Covers a range of post Phase 2 TRL levels.
  - Can also pursue ROSES in parallel with an ongoing Phase 1 or 2.
  - See next two pages for detailed opportunities.
- **NASA Pre-project and Project funding**
  - Case-by-case basis.
  - Tech Monitor's project and program office connections especially important.

How the ROSES NRA is Relevant

- Annual NASA Research Announcement (NRA), solicits basic and applied research in support of SMD.
- Covers all aspects of basic and applied supporting research and technology in space and Earth sciences. Contains many individual program elements.
- **Awards range from <$100K/yr for focused, limited efforts (e.g., data analysis) to >$1M/yr for extensive activities (e.g., development of science experiment hardware). Typical period of performance is 4 years**.
- A program element may select anywhere from a few to several dozen proposals in a given year.
- Organizations of every type: Government and private, for profit and not-for-profit, may submit proposals without restriction on number or teaming arrangements.
- 2011 ROSES NRA is at

  http://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solId={AEF75D0F-2272-7DE7-D52A-295B47C8F5CF}&path=open

ROSES NRA Elements that are Particularly Applicable (in years in which they're competed)

- Astronomy & Physics Research and Analysis (APRA)
- Mars Fundamental Research
- Lunar Advanced Science and Exploration Research
- Advanced Component Technology (ACT)
- Advanced Information Systems Technology (AIST)
- Mars Technology Project (MTP)
- Astrobiology Science and Instrument Technology Development (ASTID)
- Astrobiology Science and Technology for Exploring Planets (ASTEP)
- Planetary Instrument Definition and Development (PIDDP)
- Mars Instrument Development Project (MIDP)
- Strategic Astrophysics Technology
- Instrument Incubator Program (IIP)
- Airborne Instrument Technology Transition (AITT)

NASA ESMD:
Some Potential Post Phase 2 Funding Sources

- From ESMD's Exploration Enterprise Workshop, Galveston, TX, 5/25/10 (AIAA-sponsored conference)

http://www.nasa.gov/exploration/new_space_enterprise/home/workshop_home.html

- **Presented NASA's initial plans for the potential Human Space Exploration programs, announced in the FY2011 Budget Request, to industry, academia, and NASA personnel.**
- The presentations were Web-streamed and are publicly available on the above website. Or our office can e-mail you copies if you wish.
- Research and technology opportunities include:
  - Enabling Technology Development and Demonstration (ETDD)
  - Heavy Lift and Propulsion Technology
- Initial flight demo opportunities for developed technologies include:
  - Flagship Technology Demonstrations
  - Exploration Robotic Precursor Missions

NASA SOMD:
Some Potential Post Phase 2 Funding Sources

- **A major driver continues to be SCaN (Space Communications and Navigation).**
- SCaN SBIR Commercialization Workshop held 8/26/2010 at NASA ARC.
  - Presentations are publicly available at https://www.spacecomm.nasa.gov/spacecomm/programs/technology/sbir/presentations_2010/default.cfm or we can e-mail you copies if you wish.
- Technology areas of interest include optical communications, RF communications, communications operations software, networking technology, antenna technologies, positions/networking/timing (PNT), software defined radio, SCaN and crosscutting infrastructure, and power efficient use of allotted communication bandwidth.
- For further details, including specific NASA needs and opportunities for working with SCaN prime contractors: contact the Workshop leads, Luis Mederos (NASA ARC; SOMD SBIR Field Center Program Manager) and Jim Stegeman (NASA GRC; Space Operations Mission Directorate Rep).

Beyond Phase 2 Conference: Commercialization and Business Development Resources

- 2010 Conference presentations were formerly publicly available at the conference website. We can e-mail you copies if you wish. These may be of particular interest:
- Alfred Clark – Dawnbreaker
  - Lots of good recommendations for small companies on technology transition, commercialization assistance and partnering.
- John Williams – Navy
  - Transition programs and commercialization assistance for small companies. The Navy is an excellent role model for other sponsoring organizations.
- Mary Ann Beyster – Organizing and Financing
  - Financing and organizational models for small companies - Options and selecting.
- Partnering with Primes and Getting into Supply Chains (Not an exhaustive list of primes, but these are the ones that presented at the conference):
  - Nafiz Karabudik – Partnering with Lockheed Martin
  - Scott Gillette – Partnering with Northrop Grumman
  - Rich Hendel – Partnering with Boeing
- 2011 Conference will be September 12-15

  https://www.beyondphaseii.com/2011/index.aspx

Other Commercialization and Business Development Resources

- **Spring and Fall National SBIR Conferences, and also Regional SBIR Conferences.**
  - Resources for small companies include:
    - One-on-one meetings with SBIR agencies and primes
    - Array of presentations on methods, strategies, resources and contacts for maximizing SBIR technical, business development, commercialization, infusion, and funding success
    - Informational poster sessions
    - Many networking opportunities
    - Pre-conference short courses
  - Presentations from previous Conferences are openly posted on their websites, but not indefinitely. We can e-mail you copies if you're interested.
  - 2011 Spring National Conference (April): Madison, WI
  - 2011 Fall National Conference (dates TBA): New Orleans, LA
- **SBIR Gateway:** broad scope SBIR information site. Includes news items, search services, conference information, assistance services and more.

  Website: http://www.zyn.com/sbir/

Establishing NASA Points of Contact

- We may communicate with companies about NASA/JPL needs, technical relevance, applications, technical subtopic details and clarifications, etc.
  - The one exception is the Blackout Period (from Solicitation Release in early July through Phase I Awards Announcement in November).
- You are encouraged to contact us!
  - If you do not already have NASA technical point(s) of contact, you can contact the **SBIR Technology Infusion Manager (TIM) or the Field Center Program Manager at the desired Center(s).**
    - http://sbir.nasa.gov/SBIR/pgminfo.htm
    - We can provide you with relevant leads and points of contact.

JPL Points of Contact

- Indrani Graczyk – Field Center Program Manager
  - Indrani.Graczyk@jpl.nasa.gov
- Byron Jackson – Administration
  - Byron.L.Jackson@jpl.nasa.gov
- Carol Lewis – Technology Infusion Manager
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